LIGHTING DATA

EDISON LAMP WORKS
OF GENERAL ELECTRIC COMPANY

GENERAL SALES OFFICE HARRISON, N. J

The Lighting of Show Windows and Show Cases

Information compiled by
A. L. POWELL
Lighting Service Department

SYNOPSIS:

For information regarding MAZDA lamps and lighting questions, refer to the nearest sales office

To insure receipt of bulletins, notify the Department of Publicity, Edison Lamp Works of General Electric Company, Harrison, N. J., of any change of address

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Reasons for Show Window Lighting

The enormous advertising value of the show window is not to be doubted. Every progressive merchant realizes this, and huge

FIG. 1

Night View of a Show Window Utilizing the Most Modern Lighting Effects. Three brilliant red gowns are displayed against a green and black velvet background. General lighting provided by 150 watt MAZDA C lamps in individual angle reflectors on one-foot centers. Half of the units are equipped with amber color screens. A spot lamp directs a strong beam of unmodified light on the artificial (silver cloth) plant in the background. The general illumination of a light yellow tone emphasizes the color of the gowns in a most striking manner. It is interesting to note that the floor and structural elements are light in color and with a dull finish. All lighting equipment is hidden from view by the draperies.

sums of money are spent for show windows. Anyone walking along the sidewalk during the day will stop to look at a striking display in a window. At night the window display not only attracts, but the contrast of the brightly lighted area against the relatively darker portions of the building compels attention. The show window of the store represents a relatively large investment, and its fixed charges are heavy in that its space is taken from the store area and of course the rent is figured on the total square feet occupied.

A statistical expert recently reported some tests as to the value of window space to a store. Among other items, he reached the conclusion that the space devoted to a show window is worth a surprisingly large proportion of the rental value of the entire store. In one store, more than 100 feet long, the windows, only 2 feet deep, proved to be worth 12 per cent of the rent asked for the whole place.

Now, it is axiomatic that the more hours per day a shop or piece of machinery is used the less proportionately become the fixed charges. Therefore, from an economic standpoint the valuable show window should be utilized every possible moment. If when the sun sets the show window becomes useless to the proprietor, he is actually losing money every hour there is anyone on the street. Fortunately, however, there is no necessity for the display to become valueless at nightfall, for the modern methods of supplying light cause the goods in many instances to appear even better than by natural light. The cost of proper window illumination is such a small item in comparison with the expense of merely having the window available that it can almost be neglected.

As a result of wide publicity on the general subject of window illumination, the standards have been constantly rising and window illumination has improved remarkably in the last few years. No longer does the well-posted display man decorate the window attractively and then have it spoiled by improper lighting.

Effect of Intensity and Color on Drawing Power

The practice of providing illumination in show windows during the evening hours has long been accepted by merchants as a successful method of promoting sales. However, in the past there has been no numerical data to indicate the relative drawing power of different levels of illumination.

It is apparent that the influence of a window display is measured by its power to cause passersby to turn from their course and stop before the window. Since it is possible to count the number passing and the number so diverted during a given period of time, we have a numerical basis for measuring the attracting power. The results of an investigation, based on these facts, were given in a paper, "Effect of Light on the Drawing Power of the Show Window," by Walter Sturrock and J. M. Shute, noted in the bibliography

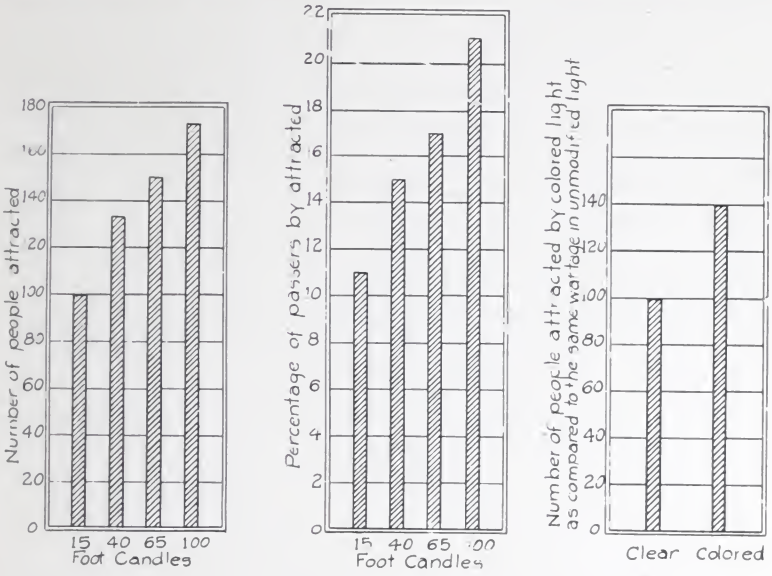

FIG. 2

The Chart at the Left Shows That 33 Per Cent More Passersby Stop to Look at a Window When the Intensity is Increased from 15 to 40 Foot-candles, While 50 Per Cent More Stop When the Intensity is Raised to 65 Foot-candles, and 73 Per Cent for 100 Foot-candles. With an intensity of 15 foot-candles the chart shows that 11 per cent of the total number of passersby were attracted to a certain display while for 100 foot-candles 21 per cent stopped. Color lighting will still further increase the drawing power of the show window

The fact that this investigation was carried on by two different corps of engineers and the data were obtained from two stores on main thoroughfares, in each of two widely separate cities—Newark, N. J., and Cleveland, Ohio, should give added value to the result. By making observations at different hours, on different evenings of the week, under various weather conditions, and over a period of several months, representative data were obtained.

In this investigation an attempt was made

First: To determine the actual drawing power of a window when lighted to different levels of illumination.

Second: To obtain the drawing power of colored light and of spot lights.

For the first part of the investigation the intensities of illumination ranged from 15 foot-candles to 100 foot-candles, the lower limit being chosen as that value at which the object in the window could just be seen in detail and yet had very little advertising value. Available equipment made it impossible to go above the 100 foot-candle limit. For the second part of the investigation the drawing power of novel colored lighting effects obtained from a given wattage was compared with the drawing power obtained by illuminating the window with unmodified light from equal wattage. Each series of tests consisted of a sufficient number to make it possible to obtain average results. These numbers varied, according to the conditions under which the test was run and the character of equipment used.

The results of this investigation are shown in Fig. 2. The chart at the top shows the comparative drawing power of various intensities of illumination with the number of people attracted at 15 foot-candles taken as 100 per cent. The center chart shows the actual percentage of total passersby who are attracted by the different intensities while the chart at the bottom shows the comparative drawing power of colored lighting over unmodified light of an equal wattage.

The value of a show window is a direct function of the number of people who will pause to look at the display. From these tests it is apparent that about 11 per cent of the people on the street will pause to look at an average display of dry goods when illuminated to 15 foot-candles, whereas 21 per cent will stop to look at the same display when it is illuminated to a high intensity or 100 foot-candles. In other words, light can be used in this manner to practically double the drawing power of the show window. The tests further show that the novel and artistic effects possible through the use of colored lighting still further increase the drawing power of the window. The additional cost of high level lighting becomes an entirely negligible item when considered in terms of the investment represented by the window space.

General Considerations

Beyond a doubt the show window is a miniature stage, and the display man a scenic artist and stage director. He sets his scene, then places his actors and properties as in Fig. 3. He can learn much with regard to artificial lighting from the stage manager.

The stage manager carefully conceals his light and he never annoys the audience or distracts its attention by permitting bright lamps to be visible. The display man should make it possible for the person on the sidewalk to view his display with equal com-

FIG. 3

The Principles of Stage Arrangement Have Been Applied to This Show Window. The life-like figures are arranged in characteristic attitudes and the furniture properly placed. A new method of lighting is applied. Slightly over one foot from the background a row of angle type reflectors with 75-watt MAZDA C lamps are recessed in the ceiling. These illuminate the wall to a fairly high brilliancy and reveal the figures in silhouette. A solitary light source at the front casts the shadows which would prevail on the features of the old man seated at the table. With this arrangement not only is a pleasing picture created, but the objects being merchandised, in this case the heater and radiator, are shown in their natural settings

fort. It is true that on the stage, if it is desired to blind the audience during a magician's act or change of scene, lamps are located around the edge of the stage with reflectors to throw the light in the eyes of the assemblage. A window outlined with light sources gives a similar effect.

Of course, there is no rule to which there are not exceptions. Occasionally on the stage we find a room "set" where a hanging fixture, bracket lights, or fireplace are part of the furnishings, but you will notice that the ingenious stage manager never permits these to be very bright. Similarly, in a show window one or two fixtures with small lamps are permissible to carry out some decorative scheme. This is well shown in Fig. 4.

Another case is a cafe window, cheap jewelry store window, or the like, where it is often desirable to place a fairly bright light in view to attract attention, but in these instances there are seldom any goods which the proprietor desires the public to examine closely and critically.

The lamps to light the display should never be in view, for the store is selling merchandise, not electric light or fixtures. The thought of the manner in which the window is lighted should never enter the casual observer's mind.

On the stage the mechanism of the lighting, the border lights, footlights, flood lamps and spot lamps are always masked or concealed from view. The window lighting equipment should be hidden with a drapery or other valance.

FIG. 4

As Pointed Out in the Text, There Are Exceptional Cases Where it is Desirable to Have Light Sources in the Window Itself. Here the hanging fixtures, portable lamps and candle-sticks form part of the setting. Relatively low candle-power lamps are used in these so that they are not brilliant or glaring. In fact, they merely present a natural appearance with the high intensity general illumination provided from overhead concealed light sources

Lamps and Reflectors

The electric incandescent lamp has become practically the standard illuminant for show window lighting. It does not damage the goods or cause strong currents of air which deposit dust. There are no products of combustion to introduce moisture in the window, which often affects the display and in winter forms frost on the glass. Incandescent lamps and reflectors can be readily concealed.

The natural distribution of light from the incandescent lamp is about equal in all directions, hence to get the full benefit of the light all lamps should be equipped with proper and efficient reflectors, directing the light on the goods rather than allowing it to illuminate the ceiling of the window and escape into the street. In a theater the electrician does not waste a lot of light up in the flies or out in the auditorium, but provides each lamp or group of lamps with reflectors to utilize as much as possible of the light.

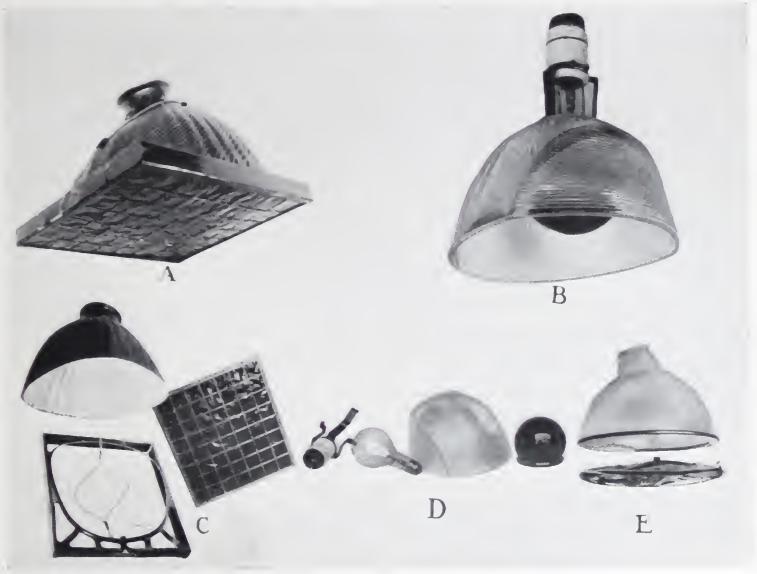

FIG. 5

Various Types of Modern Window Lighting Equipment

A—One-piece mirrored glass angle type reflector with color screen in place

B—The most recent type of prismatic glass window reflector, special holder and glass color cap

C—Component parts of the equipment shown in A. It is interesting to note the color screen holder and asbestos cord saddle for attaching this to the reflector

D—The holder, lamp, reflector and color cap which are shown assembled in B

E—Another type of prismatic glass angle reflector and gelatin color screen. A special prismatic shield is provided to conceal the filament from view which proves of particular service in corner and island windows

There are many types of reflectors (Fig. 5) suitable for window lighting which have been especially designed for this service, and so constructed as to give the correct distribution of light for windows of various dimensions. The typical show window reflector

is what is known as the angle type, sending the light down and to the side rather than straight downward.

It is apparent that a high shallow window requires a different distribution of light from that necessary for a low deep window if we are to have uniform illumination. These varied distributions can be obtained by either changing the contour of the reflector or modifying the angle at which the holder is set.

Tests and experience have indicated that individual prismatic and mirrored glass reflectors are best suited for window lighting. They accurately control the distribution of light and are of high efficiency.

In choosing a mirrored glass reflector care should be taken to see that its surface is of such a character that it will not depreciate with time.

One advantage of the prismatic unit is the fact that a slight amount of light is transmitted through the glass, which serves to illuminate a painted sign or other advertising matter which might be placed on the upper portion of the window.

Data on the proper reflector to choose for the particular window under consideration can be obtained from the manufacturers of window lighting reflectors.

Intensity of Illumination

It has been pointed out that the higher the intensity of illumination in the window the greater the percentage of people on the street who will pause to look at the display. Hence from economic considerations high level lighting is extremely desirable. From an engineering standpoint, the illumination necessary to show off the goods in a window properly will depend to a certain extent on the color of the goods on display. It is a well known fact that we see things by the light reflected from them to the eye. It is evident that a window with white or light colored goods will send back to the eye a great deal of the light falling on them, while one containing dark goods will reflect but little light and hence appear dim if not well lighted. If the window is likely to have goods of all kinds on display it is necessary to plan the illumination so that the most difficult condition is fulfilled.

In addition to the above consideration as to the amount of light required to illuminate the window properly, there are a number of variable factors which will also affect the result, for instance, the location of the street. If in the center of the town surrounded by lighting of a high intensity from the street lamps and adjacent

signs, proportionally more light will be necessary to make the window stand out prominently than if it were on a side street or in the outlying portion of the city. In general, the size of the city will have some bearing on this question, for in most cases the larger the town the higher the standard of illumination. The depth of the window will also have a bearing on the size of the lighting units, for in a deep window there is a greater area to be illuminated than in a shallow window. The type of reflector used is also important. The more efficient the reflector, the greater the amount of light reaching the goods from each lamp. The following table indicates the desirable watts per running front foot of window, using MAZDA C lamps equipped with efficient reflectors. This is, of course, based on average figures, and in applying these values local conditions may affect the result. For example, some small town may be very brightly illuminated, and in this case the windows really go in the next larger class of cities. These figures are based on common practice for the center or business portion of the town, and in outlying parts somewhat lower values may be permissible. Colored lighting obviously requires much higher values.

Size of City or Town	Depth in Feet of Window	Watts per Front Foot
Up to 5,000	2–4	30
Up to 5,000	4–8	40
Up to 5,000	Above 8	60
5,000 to 25,000	2–4	40
5,000 to 25,000	4–8	60
5,000 to 25,000	Above 8	75
Above 25,000	2–4	60
Above 25,000	4–8	75
Above 25,000	Above 8	100

Some merchants vary the intensity of light for different displays by substituting larger lamps as occasion demands. A much more convenient scheme is to wire the window with say two circuits, and eliminate every third lamp when light displays are used and have the maximum illumination for a dark dress.

Color and Spot Light Effects

The show window is designed primarily to attract the crowd and compel its attention. Startling, novel features are in this respect an asset, yet it is not good taste to use methods which

make the display garish. Artificial light is one of the best means at the disposal of the display manager to produce the desired effect. The possibilities in the way of colored lighting have not yet been fully appreciated. Most windows are still lighted with approximately the same kind of light that has been in use for many years. As pointed out before, the display manager is in reality a miniature stage director, and he has, therefore, something to learn from Belasco, Urban and Rhinehart. These great artists of stage direction do not confine themselves to the unmodified light from the incandescent lamp, but use all colors of the spectrum. They obtain such colors by the use of gelatin screens or superficially colored lamps.

Colored window lighting was first brought prominently to the general attention of the electrical industry in a lighting exhibit at the Atlantic City convention of the National Electric Light Association in 1919, where a full sized show window with a rather elaborate lighting layout attracted a great deal of attention.

This particular display (Fig. 6) indicated some of the wonderful possibilities. It consists of an exhibit of wicker furniture, with the window arranged somewhat like a summer porch. It was made quite evident that all window displays should not be treated in the same manner, but that each picture should receive special attention.

Since this time, colored window lighting has indeed become popular. A number of very satisfactory devices for obtaining color modification with standard show window equipment are now on the market. Some of these are pictured in Fig. 5. Both gelatin and glass are used as the means of obtaining color, the glass offering certain advantages in permanency and durability. Throughout the entire country the show windows of the leading stores are applying this means of attracting attention.

The display man from his training and temperament is naturally artistic, and once having had the idea of colored lighting brought to him, makes use of its possibilities in a remarkably artistic manner. He recognizes that the show window's purpose is to attract attention and to create a distinct impression. The possibilities along this line are unlimited.

Some of the most simple arrangements often prove to be the most interesting, for example, the exhibit in a leading New York department store consisted of a gigantic peacock with tail outspread. The lighting of this was accomplished by a relatively low intensity of blue illumination from footlights, the regular lighting

turned off. Overhead at one corner of the window was located a standard incandescent stage spotlight so focused that it sent a circle of illumination approximately two feet in diameter to the tail of the bird. The combination was particularly impressive and excited much admiration, although the laymen did not realize that the special lighting was the thing which made the exhibit impress itself on his mind.

FIG. 6

A Show Window Well Adapted to Color Lighting. One can picture the effect of green overhead general illumination, a low intensity of unmodified footlighting, the table and floor lamp illuminated to a low intensity and two overhead spot lamps with purple and orange color filters. The spots are directed in such a manner as to give the impression that the portable lamps are furnishing the illumination. Certainly one would pause to view this attractive picture.

In art, all pictures are not of the same color, the same brightness, and do not express the same mood. Neither should every show window in a store be equally bright or lighted in the same manner. If one glances down a group of windows in a large department store they should not all appear the same. Each display should be treated differently. For some exhibits a pinkish tint of light might be suitable. For others a deep amber. Still others

might require a light green, etc. The display man can readily determine just what effect he desires.

Every large store should have several sets of gelatin color screens or color caps which can be attached to the show window reflectors and the lighting modified as displays are changed. For pure color, an entire section of the window can be equipped with the color screens, or, if just a suggestion of color is wished, a few of

FIG. 7

The Display Man in This Progressive Store Fortunately Has the Tools with Which to Work. He creates a pleasing arrangement of the merchandise and then proceeds to paint it with light. Standard window lighting equipment is furnished with red and green screens on alternate units. A number of spot lamps with amber color screens are concealed behind the column. These direct beams of light on various objects in the center of the display. A larger spot without color screen catches the center figure. The light colored background is necessary for most effective use of modified lighting

the units can be equipped, leaving the others unmodified. It would be possible, for example, to have a display which required deep green lighting at one end, shading through amber to clear or unmodified lighting at the other end. This can be readily accomplished by the proper selection of color screens and their application to the show window reflectors.

Intelligent application of colored lighting to a display produces excellent results. Merely because a merchant has color equipment available he should not use it promiscuously with every display.

Improper application of color produces effects which are inartistic and annoying. The chief application of color is to create an atmosphere or setting, in other words, the psychological effect of the lighting should be given consideration. One should study the effect of color on the particular merchandise being displayed and ask himself if there is a logical reason for the use of the particular color he has in mind. As illustrating this point the following table contains some very brief suggestions indicating the general principle involved:

Amber Screens or Color Caps
Women's Fall Wear in Autumnal Setting
Red and Amber Mixed (Suggesting Warmth)
Living Room Furniture
Green and Amber Mixed (Suggesting Bright Sunshine)
Women's Spring Wear
Green (Suggesting Cool and Quiet)
Porch Furniture
Blue (Creating a Cold Atmosphere)
Toy Display with Santa Claus and Snow
Red and Blue Mixed with Spot Lamps
Frocks and Dresses
Red and Clear Mixed
Lingerie
Red and Green Mixed with Spots to Catch High Lights
Cut Glass and China

It is not necessary for the merchant to install a great deal of special wiring or multiplicity of circuits in windows to get the different effects, although to produce a colored light, of course, means considerable absorption, and hence a higher wattage is required for lighting any particular area. The pleasing effects secured, however, amply repay for this additional expenditure. If standard show window reflectors with 150-watt MAZDA C lamps are placed as close together as construction will permit, there is usually sufficient wattage to obtain any of the desired effects.

The MAZDA C Daylight lamp has become another valuable medium in the hands of the display manager. An installation of MAZDA C Daylight lamps causes the window to be distinctive and stand out prominently. A window so lighted is very striking and the goods are shown in practically their daylight value. It is not expected that the MAZDA C Daylight lamp will supersede the MAZDA lamp for all window lighting, yet there are certain displays which are shown to their best advantage under this kind of light. Under the light of the MAZDA C Daylight lamp linens and white goods appear pure white rather than slightly yellowish; men's clothing, particularly if blue or black, shows up splendidly, furs, jewelry, shoes, neckties, and the like, are wonderfully well

displayed under the MAZDA C Daylight lamp. Along with the other colored lamps a set of these approximate daylight lamps for a couple of sections of the show window should be available, and when such displays as those mentioned are set up, these lamps should be installed to obtain the best effect. With colored lighting it is possible to vary the equipment as occasion demands, avoiding monotony and obtaining the best advertising value.

In addition to the general lighting in color, spotlight effects can be utilized to excellent advantage in the show window. A number of types of spot lamps are now standard, some of which are

FIG. 8

A Group of Incandescent Spot Lamps Suitable for Show Windows

A—The footlight type lens spot lamp for 250-watt MAZDA C concentrated filament (floodlighting) lamp

B—A lens spot lamp and color holder designed for attaching directly to an existing outlet. This unit utilizes a 500-watt floodlighting MAZDA lamp

C—A suspension type spot lamp with color screen holder which can be attached to a hook in the ceiling and plugged to a receptacle. Such units are available in the 500- and 1000-watt sizes

D—The MAZDA C lamp with concentrated filament for floodlighting service

shown in Fig. 8. The most useful forms employ concentrated filament (floodlighting) MAZDA C lamps of the 250- and 500-watt sizes. Some forms can be attached directly to the window circuits, others are designed to be suspended from the ceiling and plugged

in at will, while other forms (footlight type) can be placed on the floor. The spotlights bring out particular objects to a high intensity and are a very valuable tool in the hands of the display man. Spots of clear light can be superimposed on general colored lighting, spots of colored light on unmodified general lighting, or spots of different colors used in conjunction with general illumination in color. The ground has scarcely been scratched and new uses of these effects are to be noted daily.

The spot lamps described above employ a lens in conjunction with concentrated filament lamps and produce a sharply defined spot. Recently, wide application has been made of floodlighting units for window work. These employ parabolic reflectors of

FIG 9

A Window Floodlight with 200-watt MAZDA C Lamp This consists of a mirrored parabolic reflector, adjustable socket and bracket and color screen

mirrored glass, standard MAZDA C lamps and a holder mounted on an adjustable bracket. Color screens are also used with this type of device. Such a unit produces a concentrated beam with considerable "spill light" The effect produced with window floodlights directed on particular objects is very pleasing, the objects standing out brilliantly and the color shading off in the surrounding areas. A typical window flood lamp is illustrated in Fig 9

Direction of Light

In general, the light must come from in front of the goods in order to avoid bad shadows. Shadows are necessary, but they should not be too sharply defined. We should have no difficulty in distinguishing objects in shadow, nor should we confuse the edge

of the object with the edge of the shadow. The so-called shadowless windows are unsatisfactory since the sense of size, proportion, distance and texture are either lost or so badly distorted as to repel observers rather than attract them.

Lighting units should be placed in the upper front part of the window. In order to introduce the certain element of diffusion mentioned above, a number of small lamps are preferable to one large unit giving the same amount of light. There may be exceptions to this rule.

The object of a show window is to attract attention by a striking appearance. It is a well-known fact that very startling effects can be produced by varying the direction of light. These can be readily investigated with the assistance of a small shadow box. The display man spends hours arranging an artistic window. He should devote a part of that time to the adjustment of the lighting. All displays should not be lighted in the same manner. The display manager should experiment a little. Some exhibits may require the predominating light coming from one direction, others from another angle. This can be done by varying the size of lamps used.

Those at one end of the window may be 100-watt lamps, while those at the other end are, say, 25-watt. Great possibilities along this line present themselves.

On the stage there are many points at which lighting units can be located, overhead, below and at the sides. In general, space in the show window will not permit such latitude. The most useful lights on the stage are those in the border and proscenium strips. They supply diffused light from overhead and in front. It is true that footlights are used a great deal on the stage, but these are employed more as a matter of necessity and are required when the actor is "down stage" or near the audience. Some stage directors, recognizing the disadvantage of footlights, have eliminated them by a special arrangement of overhead units.

Footlighting is being used to a certain extent for show windows and illuminates certain classes of display in an effective manner. Some of the equipments for this purpose are pictured in Fig. 10. Light from below should, however, be applied with discretion otherwise effects similar to those shown in Fig. 11 may be the result. Some light from overhead to cut shadows is always necessary as in Fig. 12.

The actor, knowing that he is to appear before the footlights, adjusts his makeup to offset the reversal of all facial shadows which result from the light coming from below rather than overhead. A lay figure or model in the show window is not decorated in this manner and strong upward shadows produce grotesque results. Some light coming from below, however, is often desirable to reduce the shadows at the base of the figure and show the footwear to better advantage.

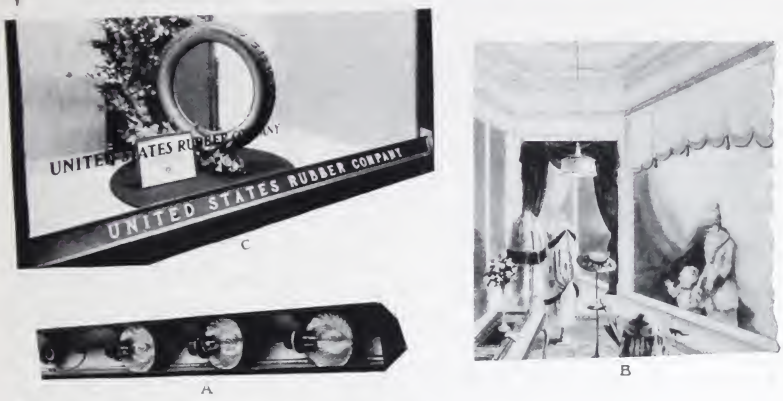

FIG. 10

A Group of Footlight Devices Designed for Show Windows

A—Individual mirrored glass reflectors concealed by a metal housing
B—Sectional mirrored glass reflectors in a suitable housing
C—A painted trough footlight combined with a luminous sign
Color screens can be used with all of these devices

Except under special conditions (where the display is practically on the floor of the window) lamps should never be placed in the middle of the show window ceiling, for this arrangement causes the front of the goods displayed in the foreground to be in shadow. Another objection to lamps so placed is that they cannot be effectively concealed.

A lamp should never be placed directly outside of the window. Some persons think this necessary to attract attention, but the glare from a high candle-power light source for this purpose is very bad, as illustrated in Fig. 13. A light outside the window causes the sidewalk to be brilliantly lighted, which is not the best condition, for a window should stand out by contrast. Lamps outside of a window do not light the goods effectively.

Trimming and Background

Every merchant knows that proper window dressing is a very important factor in the standing of his store. The public is very prone to judge a store by its window display. As far as the lighting is concerned it is important to arrange the dress so that one article will not cast a shadow on another.

The window background should be arranged to suit the dress. It should be chosen to avoid specular reflection. A mirrored backing is particularly undesirable as it shows the reflection of the show

Fig 11

The Effect of Direction of Light on a Lay-figure From left to right, as follows Illuminated with a strong beam of light from below—all shadows reversed, illuminated with a strong beam of light from overhead—shadows harsh and contrasting, illuminated from a semi-diffused light overhead and in front—shadows soft and natural, illuminated with completely diffused light—figure is flat and unattractive

windows on the opposite side of the street as well as the lighting units of the window itself. Many windows have glass above the paneled woodwork, as in Fig 14, in the rear for the purpose of allowing daylight to enter the front portion of the store. To avoid reflections from this glass, shades that harmonize with the background should be provided to cover it at night.

Some of the windows of recent construction have a feature which is quite desirable from the lighting standpoint. They employ a light colored background with mat or dull finish. The light color of the background makes the window appear especially prominent while the dull surface prevents annoying reflections of the lamps.

Some excellent examples of this finish are given in Figs 1, 7, 12, 15 and 24.

One of the most common causes for complaint of inadequate window lighting is due to the use of improper backgrounds For a

FIG. 12

As Pointed Out, Footlighting Applied with Discretion Will Produce an Attention Compelling Display Here afternoon dresses are on display in a setting of wicker furniture and artificial flowers The principal lighting is furnished by clear MAZDA C lamps in sectional mirrored glass footlights. A central luminaire with lamps well shielded and two torchaires visible in the background furnish some general overhead illumination to relieve the dense shadows. The brightness is of a low order and color contrast pleasing

thing to appear bright, it must reflect the light well. In other words, there must be a relatively large area of fairly high brightness. No matter how much light is supplied in the show window with the walnut, mahogany or dark oak background, it will never appear brilliant and striking. For effective colored lighting, light colored backgrounds are absolutely essential. It is decidedly uneconomical to attempt to supply colored lighting for the windows with the dark background. Under these conditions there is comparatively little area to reflect the light, the impression of color is largely

FIG. 13

Do Not Place High Candle-power Light Sources Near or Between Windows, as is Done in This Case. They distract the attention and prevent the display from being viewed with ease

lost and the additional electric energy necessary to obtain color cannot be justified. Continuing our analogy of the show window and the stage, one seldom sees a scene painted a dark dingy brown or gray, unless it is the setting for a tragedy.

Overcoming Daylight Reflections

Every merchant has experienced difficulty from reflections in the plate glass of his window. These may be of the sky, opposite buildings or passing objects. Under certain conditions they are so severe as to prevent the merchandise being visible. There has been no entirely satisfactory method as yet developed to overcome these reflections. Provision of suitable awnings for some situations

partially solves the matter. A patented design of curved plate glass will absolutely eliminate the trouble. However, this is quite costly, detracts from the general appearance of the window, particularly at night, and uses valuable space.

Artificial illumination of the show window during the daytime is often attempted as a solution. Its effectiveness depends on local conditions. In order that reflections be eliminated it is necessary to build up the intensity within the window to a point which will almost equal the daylight intensity prevailing on the street.

FIG. 14

A Window Very Well Lighted with an Excellent Trim One feature, however, has been overlooked The upper part of the background is glass, to admit light to the store interior Each light source is reflected from this If a curtain had been provided these annoying images would have been eliminated

This value may be in the order of several hundred or over 1000 foot-candles. To illuminate an entire window to an intensity of 1000 foot-candles would require an abnormally high wattage and in general, physical or space limitations would preclude the installation of sufficient equipment to accommodate this wattage. Again, the radiant heat emitted by the necessary wattage in lamps would probably cause damage to the merchandise. This matter, however, is under consideration and there are prospects of there being available at a comparatively early date selectively absorbing screens which will transmit light and retain the radiant heat.

In order to obtain the maximum effect of the illumination in the window it is necessary that the background and floor covering be light in color with a high reflection factor. To attempt to light

a window finished in dark woodwork sufficiently to overcome a bad case of daylight reflection, is decidedly impractical.

One method which has been used, the details of which are described in one of the references in the bibliography, is to concentrate the light from several floodlighting projectors of high power on a particular object on display, for example, a woman's

FIG. 15

A Light Colored Mat or Dull Finish Background is Particularly Well Suited for the Display Window. It makes the window appear bright with a minimum amount of light and prevents reflections of the light sources. A valance of unique design is employed in this instance to conceal the means of lighting

white dress on a form. This limited area is illuminated to a very high intensity to overcome the reflections. The particular display is clearly visible from the street and the scheme is decidedly practical under the conditions as outlined.

Special Considerations

There are two general types of windows—the open and the boxed-in. The open window is the type usually employed in the small store, and economies of lighting must be taken into careful

consideration here. Many small stores depend on the light from the show window to assist in lighting the front part of the store, the window being backed only a distance of two or three feet. For these windows the methods of lighting outlined may be applied, but often practical considerations demand that the window lighting equipment be more or less a continuation of the system used in the store proper. In this case, where direct lighting is used the lamps should be bowl frosted, and the reflectors hung as high as possible to get them out of the ordinary field of view.

The higher grade stores have a dust-proof, boxed-in window, and the methods which have been discussed apply particularly to these.

FIG. 16

A Window the Roof of Which is Poorly Designed. Note the dense shadow cast by an overhanging beam. With such construction particular care must be taken not to continue the dress or trim above the shadow.

For very shallow windows reflectors must be used which concentrate the light in a narrow angle straight downward. In a shallow window it is desirable to avoid much shelving and dress the window on the back and floor. This arrangement keeps the shadows at a minimum. If shelves are essential, show case lighting equipment of small size must be installed to get the correct lighting effects.

Where lighting units are necessary along both edges of a corner or island window, if special precautions are not taken, practically all the lamps down the opposite side or edge are fully visible as in Fig. 17. A trough reflector is especially bad in this respect. Individual reflectors are somewhat better. There is a special type of prismatic unit with a shield to conceal the filament from view that is very

useful in these instances. Another method that can be well applied is the use of shields or louvers between lighting units. These may consist of narrow metal or pasteboard strips placed perpendicular to the window and ceiling. In this manner but one or two lamps are visible at any particular location.

In the lighting of an island window, Fig. 18, there are very exacting conditions to be met which are not found in windows that are viewed from only one direction. Due to the fact that the material on display is seen from all sides, it is necessary to illuminate it in such a way that it will appear well, regardless of the angle from which it is viewed. Any light sources in the field of vision will

FIG 17

The Effect of Using a Trough Reflector with All Lamps Visible in a Corner Window. Individual units with louvers at right angles to the glass are desirable to prevent glare

detract from the display as they are a source of glare. Some island windows have been constructed in which the ceiling is dome-shaped rather than flat, and a cove provided on all four sides of the window at the lower edge of the dome. Around this cove are located MAZDA C lamps in suitable mirrored reflectors so placed that the light is directed to the dome of flat white finish. With this arrangement no lamps or reflectors are visible and the method of illumination is, of course, totally indirect. In one very satisfactory installation, approximately 15 watts per square foot of floor area was employed.

Show and Wall Cases

The show case and the wall case are miniature show windows within the store, and the necessity for their correct lighting is the

same as that for the exterior show window. They should attract the attention of the shopper to the merchandise within, they should stand out in contrast to the surroundings, and therefore should be more brightly illuminated, see Figs. 19 and 20.

Good illumination renders sales work easy, for close selection can be made without removing goods from the case. The decreased handling also eliminates shop wear of the goods on display.

FIG. 18

An Effective Arrangement of Artificial Lighting for a Small Island Window. Angle units are set above the ceiling and the openings covered with diffusing glass. Annoying glare is reduced by this arrangement

Show cases, whether they are of the counter or wall type, must be lighted by lamps placed within the case and hidden from view. The glass of the case forms a reflecting device which gives images of lighting units placed outside which are almost as annoying as

the light sources themselves. The lamp must be concealed from the customer and special attention must be given to the protection of the clerk's eyes. The latter is in a fixed position with regard to the show case, and, if bright spots are continually visible, fatigue, headache and eye-strain result.

The lighting unit must be quite small to give the least obstruction to a clear view of the display. The upper front edge of the show case is the logical location for the lamp and reflector. This gives the correct direction of light, as pointed out under show windows.

The lighting equipment must be neat and in harmony with the finish of the metal parts of the fixtures. The modern show case is often almost entirely of glass, and neatness is, therefore, most important.

FIG 19

A Show Case Display Prominently Brought to the Attention of the Customer with the Assistance of Tubular Bulb MAZDA Lamps in Cylindrical Trough Reflectors
These units, being of small dimensions, are easily concealed from view

The wall case usually has a cornice at the top behind which the lighting equipment can be concealed. Its requirements, therefore, are not as severe as for the show case; nevertheless it is desirable that wall case equipment be small and inconspicuous.

As low a wattage as possible must be used, for a show case quite frequently is air-tight. Circulation is at a minimum and any appreciable dissipation of heat will raise the temperature of the case to such a degree that the goods are likely to be affected. This is particularly true in confectionery and cigar stores. The MAZDA lamp is especially effective in this regard as its ratio of heat to light is relatively low.

The equipment must be constructed to eliminate fire hazard. Concealing the feed wires in small metal tubing is excellent practice.

The general considerations of intensity of light are the same as those indicated under the show window, light goods requiring less illumination than dark displays. A good average figure toward which to work is from 15 to 20 foot-candles.

FIG. 20

25-watt Round Bulb MAZDA Lamps in Small Mirrored Glass Angle Reflectors Are Used in This Example of Good Show Case Lighting. All wiring is protected by metal tubing

Reflectors should be used to confine all the light to the show case and distribute it evenly over the trim. Needless to say, these should be of high reflective power to get the maximum light with the minimum energy expenditure.

FIG. 21

Small Individual Mirrored Glass Reflectors for 15- and 25-watt Round Bulb MAZDA Lamps for Show and Wall Cases

Individual small mirrored glass reflectors, Fig. 21, are available for use with the 15- and 25-watt round bulb MAZDA lamp, and

trough reflectors for use with the 25- and 40-watt tubular MAZDA lamps.

The show case, with its average dimensions of 30 inches high and 24 inches deep, requires a reflector which emits its maximum light at about 45 degrees from the vertical. The wall case is usually high and shallow, approximately 72 by 30 inches. This requires reflectors giving more concentrated distribution of light, with the maximum about 20 degrees from the vertical.

Layout for a Demonstration Window

The central station or electric shop should naturally be in the lead in any particular community with regard to lighting matters. If its show windows are equipped in such a manner that the

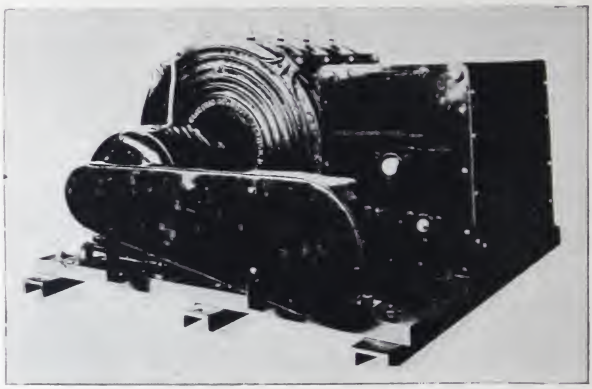

FIG 22

A Motor-driven Dimmer and Circuit-changer for Show Window Circuits

effect of colored light can be demonstrated, they will no doubt awaken much interest on the part of the merchant in this subject. A number of prominent electrical dealers throughout the country have already established this practice.

Most merchants are not in the slightest interested in selling lighting whereas the electrical dealer is vitally concerned in the question. He should take advantage not only of the drawing power of colored lighting but use it in such a manner as to compel attention to its effect. With the dry goods merchant lighting merely forms the background for his picture. In the electrical shop it is a very necessary part.

It is a well recognized principle of display work that motion or change will always attract attention. It is not logical for the ordinary store to install a changing lighting system for such a procedure might tend to draw attention away from the merchandise itself. Under conditions such as we are discussing, however, changing window lighting is indeed appropriate.

Two general methods of producing these changes are available. One employs a low speed adjustable sector flasher producing sudden changes in color such as standard for sign work, and the other a motor-driven dimmer and circuit-changer of the type pictured in

FIG. 23

Lighting Equipment Installed in an Open Window with an Internal Valance to Conceal Lamps from Persons in the Store. This particular view shows two rows of units with color screens as used in an electrical dealer's window to demonstrate colored lighting effects

Fig. 22. This latter device, although relatively expensive, is compact and functions very well.

The overhead standard window lighting reflectors should, in general, be arranged in three circuits which are called for purposes of convenience—*A*, *B* and *C*. To get a suitable number of lamps, it is necessary to have three rows in the average window. Reflectors should be placed as closely together as possible, i.e., on 1-foot centers, and arranged in steps. This is necessary to avoid one reflector interfering with light from the lamp in front of it.

Three outlets can be installed for each front foot of window; thus a 10-foot window would have 30 outlets. These should be divided approximately as follows:

Circuit *A* 15, circuit *B* 9, circuit *C* 6; for other dimensions similar proportions apply. This combination gives the possibility of low, medium and high intensity.

When color screens are applied, the densest should be placed on circuit *A*, and the lightest on circuit *C*. For example, with the

FIG 24

The Window of a Progressive Electric Shop Equipped to Demonstrate Color and Spot Lighting Effects At the left it appears with uniform general illumination, at the right with spot lamps alone turned on This window embodies a feature which is absolutely essential for colored lighting, a light background of French gray in this instance Dark hues of paint or woodwork destroy the effect of colored illumination

three primary colors, blue, green and red, circuit *A* should be blue, circuit *B* green and circuit *C* red. 150-watt MAZDA C lamps should be used. This may seem an abnormally high wattage consumption, but it is necessary on account of the absorption of the color screens.

Any of the standard window lighting equipment for color effects shown in Fig. 5 can be applied.

It is desirable also to demonstrate the effect of a concentrated beam of definite shape of rather high intensity as produced by the spot lamp. One of the larger types shown in Fig. 8 should be used on circuit *D*. Color screens are placed across the lens opening and changed as occasion requires. In a large window, two or more spot lamps can be effectively applied.

A few portable lamps are occasionally desired in the window and a fifth circuit, called *E*, should supply the baseboard receptacles serving these units.

The general scheme of wiring for a flasher layout is shown in Fig. 27. From the service one side leads direct to all lamps with a tap for the flasher motor. The other side of the line is led to a single-pole double-throw switch. One branch of this feeds the series of single-pole single-throw flush wall switches for manual control of

FIG. 25

Arrangement of Circuits for the Equipment Pictured in Fig 26 Outlets serving one color are connected in multiple and thence to a motor-driven dimmer and circuit changer which is located in a small cabinet above the entrance doorway The unmodified or clear lamp circuit is not fed through the dimmer The motor is controlled by a convenient wall switch Circuits are also so wired that any combination of color and spots can be obtained without the dimmer in the circuit

the window lighting circuits The other branch feeds these same circuits through the flasher with a tap for the motor. It is also necessary to have an auxiliary switch on the motor circuit, otherwise with the wiring arrangement shown the motor would be in operation when any of the individual circuits are thrown on manually although the flasher control would not be affected

This, of course, is susceptible to a great many changes and is most flexible. With the arrangement shown in Fig. 27 the following combinations will be obtained:

Blue overhead; green overhead; red overhead; blue and green mixed overhead; red and green overhead; red and blue mixed overhead; red, green and blue overhead; blue overhead and spot lamp, green overhead, spot lamps and portable lamps, red overhead, spot lamps and portable lamps.

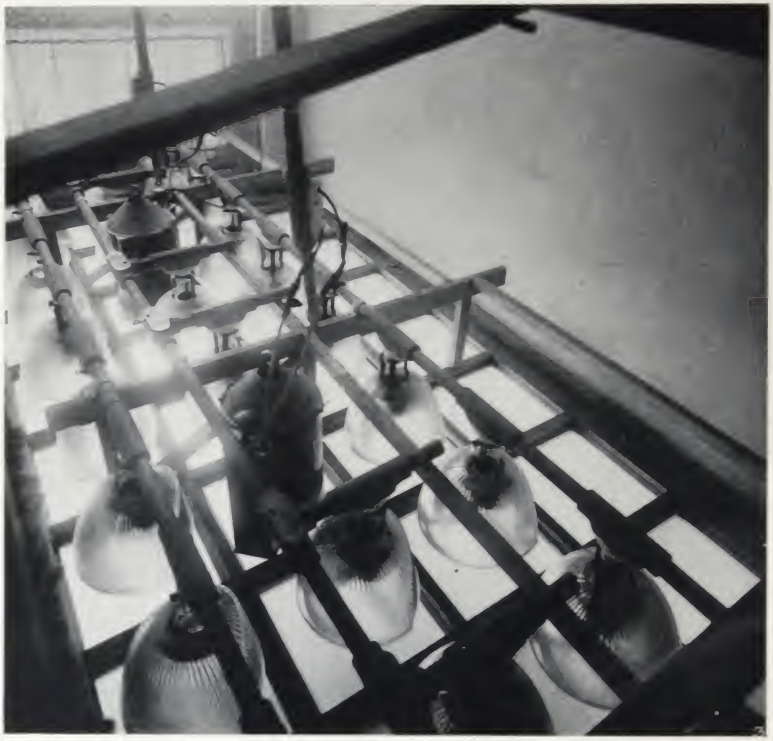

FIG. 26

Arrangement of Lighting Equipment in the Demonstration Window Pictured in Fig. 24. A false ceiling is provided in which panels of syenite glass are held by a recessed wooden framework. This glass is of the crystal or clear type with an irregular surface and has the property of concealing the light sources without appreciably distorting the distribution of light. The glass panels are loose so that they can be pushed by and shifted to one side when it is necessary to relamp or clean the lighting equipment. A standard form of prismatic window lighting reflector with glass color caps is mounted above the center of each of the front three rows of panels with sufficient clearance to allow for the removal of the glass. Standard stage suspension spot lamps with 500-watt MAZDA C floodlighting lamps are provided with adjustable hangers so that the beams can be directed at individual portions of the display. The size of the beam is controlled by a focusing arrangement which changes the distance from the filament to the lens. The glass panel beneath the spot lamp has a circular hole in order that no diffusion is introduced into the beam

It is not necessary to confine the color effect to the primary colors; amber, purple and the like are also very pleasing. If it is desired to use the window without color, the screens can be omitted from circuit *B*, for example, and this circuit left on permanently. This will provide a high intensity of unmodified window lighting of an excellent character.

An excellent arrangement for a motor-driven dimmer and circuit-changer layout is pictured in Figs. 25 and 26, the captions giving the details as to the equipment. With this particular set of

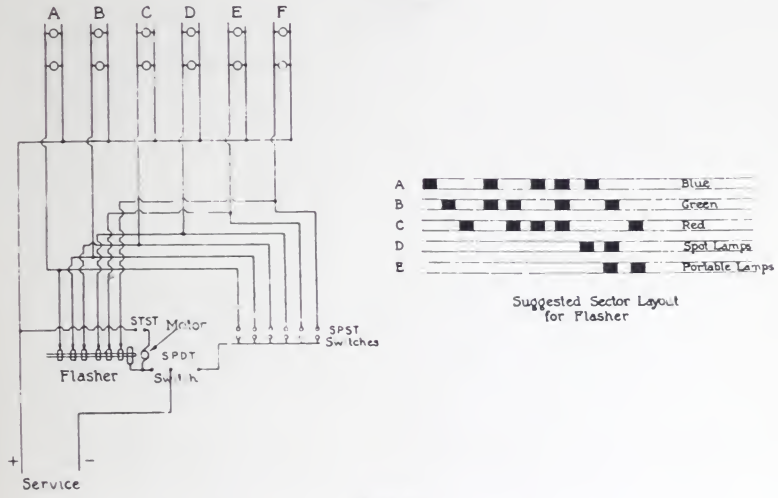

FIG. 27

A Wiring Diagram and Suggested Sector Layout for Flasher Such as Advisable in the Electric Shop to Demonstrate Modern Lighting to the Merchant

color caps as the contactors travel over the plates the changes are as follows. Amber light full intensity, gradually dimmed green light increasing in intensity to full. Green gradually dimmed red light increasing in intensity to full. Red gradually dimmed spot lights increasing in intensity to full. Spot lights gradually dimmed amber lights increasing in intensity to full.

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